

Distraction techniques in children during venipuncture: an Italian experience

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Key words

Children • venipuncture • Pain assessment • Distraction techniques

Summary

Introduction. Venipuncture in chronically-ill patients is one of the invasive procedures most frequently repeated during the day. Most children are frightened and anxious before this procedure, and during venipuncture they cry, suffer pain and refuse to cooperate, whereas parents are often worried and do not know how to help.

Studies suggest that the first experiences of pain in neonatal age can be associated with altered reactions to pain during childhood and in adulthood.

Methods. Our sample included 203 patients aged between 2 and 15 years. During venipuncture a video was shown to the patient. Pain and parent collaboration were measured using validated scales.

Results. Significant differences were observed between the mean score of pain in patients undergoing venipuncture with audio-

visual distracting technique (2.53 ± 1.76) and the mean score obtained in those undergoing venipuncture without this technique (5.22 ± 2.53).

In the group with audio-video distractors, the mean level of cooperation was 0.38 ($SD = 0.63$) compared to 0.20 ($SD = 0.54$) in the control group. In relation to the presence of parents, no significant differences were found in the mean pain scores ($P = 0.5 > 0.05$), whereas the mean scores of cooperation were significantly different ($P = 0.0076 < 0.05$).

Discussion. Audio-visual distraction effectively improved pain management and favoured children's cooperation during venipuncture. This technique is cost-effective, so it can be widely used for pain management and to promote cooperation with the child, two aspects that are of key importance in building a relationship of trustworthiness.

Introduction

Pain in children and adolescents with acute and chronic diseases is a major public health problem that has been increasing over the last 20 years. Studies confirm that pain can negatively affect the life of children as well as that of their parents [1]. Health care practices can have an impact both on pain onset and its relief. Venipuncture is one of the invasive procedures most frequently carried out during the day in chronic patients. Before and during this procedure most children are fearful and suffer from pain and anxiety [2]. Anxiety and fear are found to be inversely proportional to the age of children. Children cry, are scared and refuse to collaborate, whereas parents are often worried and unable to provide any support.

Negative reactions, including phobia linked to previous procedures, may exacerbate the situation and reduce the likelihood to successfully carry out venipuncture [3].

Studies suggest that even painful experiences during neonatal age can be associated with excessive responses to pain during childhood and adulthood. Many sources report that pain relief is both an ethical imperative and a child's right requiring an accurate planning focused on the needs and characteristics of children and their families. This requires a multidisciplinary approach that is simple, safe, effective and inexpensive capable of reducing suffering and improving the outcomes of clinical procedures in children [4, 5].

It is reported that anxiety in children can increase their subjective perception of pain, but it can be reduced if their attention is focused on a pleasant activity. Literature refers to many coping strategies that can be facilitated by means of relaxation and distraction activities.

It is also well known that if parents are properly informed, educated and trained they can improve their children's ability to cope with the procedure [6]. Furthermore, it has been demonstrated that instructions are effective only if associated with adequate parent support. So, apparently reassurance on its own very often increases anxiety in the child. Parental training must include information and teaching of useful behaviours (ex. support in enduring the procedure, distraction techniques). Parents should also be encouraged to avoid disadvantageous behaviours (i.e. excessive reassurance, criticism). Defining the role of the parents throughout the stages of the procedure is key for them to minimize their children's pain and distress. Furthermore, playing an active role in education/information activities enable them to reduce their own anxiety and positively influence the successful outcome of the procedure.

In addition, if the perception of pain does not meet children's expectations they might be unwilling to cooperate properly in the future and in adult age they could have distorted memories of the pain suffered.

Furthermore, literature unanimously reports that it is important to obtain the child's collaboration and when this is

not possible, literature suggests to postpone the procedure, possibly after negotiating the new date directly with the children to ensure their collaboration in the future.

As regards the characteristics of the nurses and health professionals performing the procedure, studies emphasize the importance of acquiring specific skills and experience in pain management and decision making [7]. It is clear that parents should stay with their children during the procedure, but the debate over this issue is still open in literature.

Several papers report that distraction (i.e. a nursing intervention aimed at identifying an alternative tool to distract the patient and divert his/her attention to something else) can reduce fear, anxiety and pain connected to painful medical procedures. These tools can include movies, interactive robot toys, virtual reality goggles, music, soap bubbles and short stories. Even though little is known about the physiological mechanism through which distraction could lead to a reduction of the perception of pain, distraction supposedly alters nociceptive responses by triggering an internal mechanism of pain inhibition [8, 9].

Of the non-pharmacological pain relief methods used during school age, literature cites audio-visual distraction and psychological interventions (i.e. explanation, therapeutic touch, encouragement, guided imagery) as the most effective [10]. It has been demonstrated that audio-visual distraction – a simple and easily applicable technique – relieves pain in children during venepuncture procedures as equally and effectively as common psychological interventions [11]. Theoretically in children, the more the distractors are attractive, the greater the pain relief, but evidence shows that engaging children in too many distracting activities during the procedure can be counterproductive. However, some distractors seem to have no appeal on adolescents undergoing repeated venepuncture procedures [12].

Aims

The goal of this study was to use validated scales to observe pain in children during venepuncture made for clinical aims while watching a movie. The secondary goal of the study was to observe children's collaboration according to the "Cooperative Behaviour Scale of Children in Venepuncture" (CBSCV).

Methods

This observational study was conducted between June and October 2010 at the "Giannina Gaslini" Institute in Genoa. After obtaining the approval of the health care director and of the ethics committee, we enrolled 203 patients aged between 2 and 15 years. These patients underwent venepuncture in the Observation and Emergency Medicine Unit and in the Day Hospital department of Auxo-Endocrinology.

With regard to the exclusion criteria, patients with mental health disorders, cognitive impairment or a history

of venepuncture in the previous three months were excluded from the survey.

Detailed information was provided to parents and children (according to their cognitive development) and parents were asked to sign an informed consent form. A movie/cartoon was shown to patients during the whole duration of the venepuncture. A paediatric nurse with clinical skills started venepuncture 2-3 minutes after the beginning of a movie/cartoon, chosen by the child according to own personal tastes. At the end the child was asked to give a score to the intensity of pain from 0 (no pain) to 10 (severe pain). If patients were unable to describe their pain with words, they measured it with the Face, Legs, Activity, Cry, Consolability (FLACC) scale. The numerical scale was used with children over 7 years, while the faces scale was used with children aged between 3 and 7 years [13].

With a view to ensure comfort and minimize pre-procedure anxiety, infants were allowed sit on their parents' lap. During and after the procedure the researcher focused on distracting the child and on involving the parent. At the end of the procedure, the child was praised and in some cases the researcher kept on distracting him/her with the cartoon/movie depending on the child's attitude and behaviour, to speed up recovery. Furthermore, the child's collaboration was assessed using the Cooperative Behaviour Scale of Children in Venepuncture (CBSCV) [14].

Also, a chart was designed to map the demographic features of patient, pain, cooperation and the presence of the parents. The statistical analysis required appropriate methods and advice from our Statistics Department. Since this was an observational study, our findings analysis was compared with the data of the literature cited in this article.

Results

PAIN

We found that of the 203 patients undergoing venepuncture while watching a video, 31 said they did not feel any pain (score = 0), 118 patients reported mild pain (score = 1-3), 49 moderate pain (score = 4-6), and 5 severe pain (score = 7-10) as reported in Figure 1.

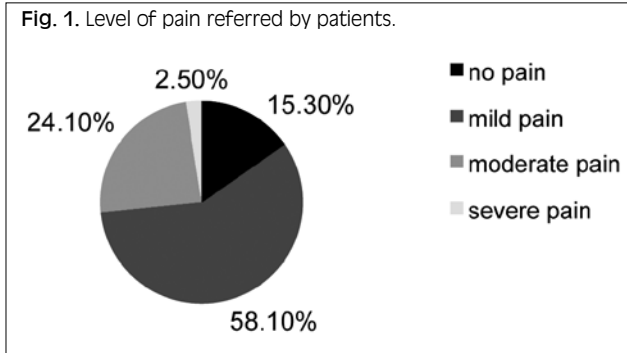
Data were analysed with the z-test and their statistical significance was equal to 99%, therefore these findings can be considered as a casual sample. The average pain score was 2.53, with a standard deviation of 1.76; the mean pain score was less than 3 (max level of mild pain) and statistically significant ($P = 0.00007 < 0.01$).

It is worth stating that a difference between male and female patients was evident in terms of venepuncture-related pain.

The level of pain in children watching a video was compared to the three age groups commonly used for internal procedures of our Institute: from 2 to 6 years, from 7 to 11 years and from 12 to 15 years.

Most of the children watching videos aged between 2 and 6 years, approximately 85.1% scored between

Fig. 1. Level of pain referred by patients.



2 and 6 in the pain scale, with an overall average 3.4; 92.9% patients aged between 7 and 11 years scored between 0 and 4, with an overall average score of 2.4; 91.4% of the patients aged between 12 and 15 years mainly scored between 0 and 3, with an overall average score of 2.0.

The variance analysis showed a significant difference between the average pain scores in the three age groups ($P = 0.0001 < 0.05$).

Significant differences were found in literature [13] ($P = 0.047 < 0.05$) between the average pain score in patients undergoing venepuncture with the support of audio-visual distraction (4.55 ± 2.26) and the average score observed in patients undergoing the procedure without audio-visual distraction (5.22 ± 2.53). In the group receiving audio-visual distraction we obtained an average pain score of 2.53 (Standard Deviation = 1.76).

We used the z-test, with a 99% statistical significance, to check the difference between the average pain scores observed in our study and those reported in literature. In particular, the comparison focused on the average pain score observed in our study (μ_1) and the average observed in the experimental group (μ_2) as reported in literature [12]. The hypothesis system we defined was: $H_0: \mu_1 - \mu_2 = 0$ (null hypothesis) $H_1: \mu_1 - \mu_2 < 0$ (alternative hypothesis)

The statistics test $Z_0 = -7.85$ is smaller than $Z_{0.01} = -2.33$, H_0 is refused: $\mu_1 = \mu_2$ at level $\alpha = 0.01$. In conclusion, a significant difference was observed between the average pain score observed in our study and the findings reported in literature on patients undergoing venepuncture using audio-visual distraction techniques ($P = .000$) [11].

As a consequence, also the average score of our research and the average score of the control group, as in literature, were significantly different ($P = .000$).

COLLABORATION

With regard to the level of collaboration, 142 (70%) and 45 (22%) patients presented a level of collaboration of 0 and 1 respectively; 16 patients (8%) were of level 2 (= non-collaborative patients).

No significant differences were observed between the average level of collaboration in the experimental group (0.38 ± 0.63) versus the control group, taken from the literature [13] (0.20 ± 0.54). The z-test was applied with a 95% statistic significance, to check the difference be-

tween the levels of collaboration observed in the group undergoing the procedure with visual distraction techniques and data reported in literature. Firstly, we compared the average value of our research data (μ_1) with the average value of the data drawn from the literature relating to the experimental group (μ_2).

Since the statistics test $Z_0 = 0.39$ was $<$ than $Z_{0.05} = 1.65$, we accept the $H_0: \mu_1 = \mu_2$. In conclusion, no significant difference exists between the average level of cooperation observed in our study and the data reported in literature on patients undergoing venepuncture with audio-visual distraction techniques ($P = 0.35 > 0.05$).

The average level of our study was compared with the average level of the control group as reported in literature. The z-test was applied and produced a statistical relevance of 95%.

Since the test statistics $Z_0 = -1.56$ was $>$ than $Z_{0.05} = -1.65$, $H_0: \mu_1 = \mu_2$ is accepted. In conclusion, no significant difference exists between the average level of cooperation observed in children watching the video and the average level of cooperation observed in patients undergoing venepuncture without distraction techniques ($P = 0.06 > 0.05$).

PARENTAL PRESENCE DURING VENEPUNCTURE

Most of the children undergoing venepuncture with visual distraction techniques (video/films) were with their mothers ($n = 122$, equal to 60.1%) or their fathers 17.7% ($n = 36$). Both parents were present in 20.2% of the cases ($n = 41$) and, finally, none of the parents were present in 2% of the cases ($n = 4$).

Pain levels were observed and compared during venepuncture in relation to the parent present; in particular, children were evaluated separately, according to whether they were with their mother, father or both parents.

Most (91.7%) of the children accompanied by their fathers obtained the equally distributed pain scores between 0 and 4, with a total average of 2.4; pain scores in children accompanied by their mothers were mostly (in 52.5%) between 2 and 3, with a total average of 2.5; finally, the pain score in children accompanied by both parents was mainly (in 70.7%) between 2 and 4, with a total average of 2.8.

The variance analysis (ANOVA) produced a level of significance $\alpha = 0.05$ to compare the average levels of pain declared by the three groups and no significant difference was found ($P = 0.5 > 0.05$).

Conversely, with regard to the level of cooperation, based on the parent present, the variance analysis (ANOVA) showed a significant difference ($P = 0.0076 < 0.05$) between the average pain scores reported by children during venepuncture.

Discussion

The main purpose of this study was to measure pain using validated scales pain in children undergoing venepuncture, while they were distracted watching a cartoon/film. The secondary aim was to observe the child's level of

cooperation using the validated Cooperative Behaviour Scale of Children in Venepuncture (CBSCV).

Considering the short and long term effects of procedure-related pain, research has recently focused on the factors involved in the increase of pain and on the improvement of pain management procedures [16]. Unfortunately, most of these studies have not been made widely available to the primary health care services yet. Although literature supports the efficacy of behavioural techniques for the relief of acute pain in children, data recommending specific actions for a specific patient undergoing a specific procedure are often vague [10]. Several studies have specifically focused on audio-visual distraction techniques. The application of these techniques by nurses and parents could reduce the time required to perform the procedure and the number of staff involved [11].

The findings of our research showed that during venepuncture with audio-visual distraction most patients (73.4%) reported either mild pain or no pain at all (from 0 to 3), with a total average of 2.53 (standard deviation 1.76).

Cooperation was 0 and 1 in 92% of cases (a good and fairly good level of cooperation respectively), with an average of 0.38 (standard deviation = 0.63).

The comparison of the data of this study with the values observed in the control group [8] showed different results for both pain and collaboration. Significant differences emerged between the average pain score in our study and the average score obtained by the control group ($P = .000$). Compared to older children, infants reported a higher degree of pain and were less collaborative (respectively $P = .0001$ and $P = .000$). This finding could be linked to the children's young age. In fact, children aged between 2 and 3 (non-collaborative in 70.6% of the cases and fairly collaborative in 29.4% of the cases) accounted for 17.1% of the patients undergoing the procedure with both parents present, whereas those only with their mothers were 5.7% and those only with their fathers were 8.3%.

Furthermore, the skills of the nurse professionals performing venepuncture in all the children included in our study proved to be of key importance. In fact, many studies show that the nurses' competences as well as their lack of confidence play an important role in pain relief actions versus other factors such as the environment or the personal characteristics of the child and/or the parent.

LIMITS OF THE STUDY

Our study was limited by a potential bias associated with the use of self-evaluation pain scales and by the fact that it was not designed as a case-control study. Objective physical measurements such as heart rate, blood pressure, body temperature or neurohormonal mediators were not made. In addition, our research considered the efficacy of the audio-visual distraction technique only in

patients undergoing venepuncture. In the future, it could be interesting to explore the efficacy of this technique in patients undergoing other medical procedures, such as wound cleansing, sutures and injections. Moreover, future studies could focus on associating distraction techniques with drug treatments, such as applying an anaesthetic cream, to see if such techniques optimise the analgesic efficacy of the cream and therefore better achieve the main goal, that is pain relief.

Conclusions

In agreement with the data reported in literature, our study highlighted the effectiveness of audio-visual distraction techniques (watching movies or cartoons) in managing pain and promoting the cooperation in children undergoing venepuncture. This distracting technique is recommended because it is effective, easy to carry out and inexpensive. Pain relief is an ethical imperative, especially in children. All health professionals ought to be more sensitive and caring about preventing and managing pain in children. In this regard, it is imperative to have a properly trained multidisciplinary team, with a major understanding of the role family-centred care and empowerment in reducing the onset and perception of pain, and at the same time know how to successfully deal with children and their families when they are frightened, anxious and stressed.

Promoting the child's collaboration was found to be equally important, especially during hospitalization, when the children and their families very often feel uneasy and stressed, because parents are very worried about their child's health conditions and at the same time find themselves in an unfamiliar or totally unknown setting. As a matter of fact, when you are surrounded by unknown people in a totally unfamiliar environment, it is much easier to end up feeling overwhelmed by anxiety and fear. This is why it is important to ensure that both parents and children are properly informed, using a language that is appropriate to the child's age and mental development.

Effective pain management blended with the collaboration of the patients and their families during the care process facilitated and improved the experience of all the family members in the hospital. These two aspects allowed to develop a trustworthy relationship with the health care team, which is fundamental in paediatric care.

We encourage further research on reducing distress and pain in children and adolescents during venepuncture. Moreover, the findings of our study suggest: 1) to search for any differences between acute and chronic patients; 2) to see if there are other distractors that may prove to be even more effective; 3) to gain more knowledge on parents experience. So, the ultimate goal is to improve the standard of care provided to paediatric patients and their families placed at the centre of a caring relationship.

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